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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/698,028	10/31/2003	David Sikharulidze	1509-467	7131

22879 7590 01/06/2006

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EXAMINER	
HON, SOW FUN	

ART UNIT	PAPER NUMBER
1772	

DATE MAILED: 01/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/698,028	SIKHARULIDZE, DAVID	
	Examiner	Art Unit	
	Sow-Fun Hon	1772	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 October 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *17-27* is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 October 2005* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Drawings

1. The drawings were received on 10/27/05. These drawings are not accepted for the following reasons. Figs. 1, 5, 8 dated 10/31/03 are acceptable with clear, clean lines and labels. Figs. 2, 3a-6b dated 10/31/03 have some units which are hard to read due to their small size, such as the labels on the top (mv?, ms?) and on the side (+2/4?). Fig. 7a, dated 10/31/03, is acceptable, but Figs. 7b-d, dated both 10/31/03 and 10/27/05 are impossible to even decipher the structures. Figs. 9a-12, dated both 10/31/03 and 10/27/05, are also undecipherable. Fig. 12 dated 10/27/05 is relatively better, but fails to do HP photocopying technology any justice.

Withdrawn Rejections

2. The 35 U.S.C. 103(a) rejections have been withdrawn due to Applicant's amendment dated 10/27/05.

New Rejections

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1-4, 9-10, 14, 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eguchi (US 5,498,762) in view Takano (Abstract, JP 405061021A).

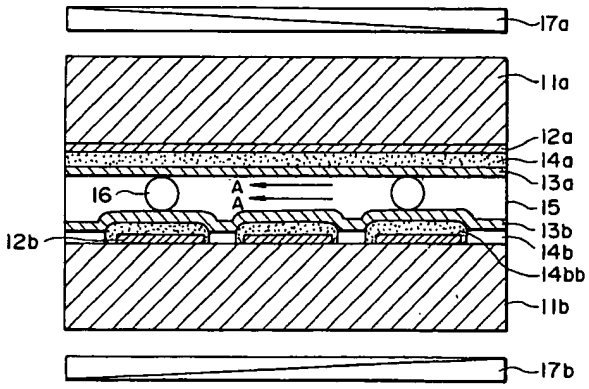

FIG. 1

Regarding claims 1-3, 6, 9-10, Eguchi teaches in Fig. 1 above, a bistable liquid crystal display device (image, column 3, lines 43-49) comprising: two cell walls (a pair of substrates 11a and 11b, column 4, lines 52-55) enclosing a layer of a composition comprising liquid crystal material 15 (column 4, lines 63-66), at least one of said cell walls being translucent (glass plates, column 4, lines 52-53); at least one electrode on each of said cell walls for applying an electric field across at least some of said liquid crystal material (electrodes 12a and 12b, column 4, lines 52-55); a first surface alignment on an inner surface of one of said cell walls for inducing adjacent molecules of said liquid crystal material to adopt a first orientation (13a, column 4, lines 63-65), and a second surface alignment on an inner surface of the other of said cell walls (13b, column 4, lines 63-65). Eguchi teaches embodiments wherein the second surface alignment (rubbing uniaxial alignment treatment, column 7, lines 1-5) on an inner surface of the other of said cell walls (13b, column 4, lines 63-65) induces adjacent molecules of said liquid crystal molecules to adopt a second orientation which is

different from said first orientation (rubbing directions which may be anti-parallel to each other or cross each other with a small intersection angle, column 7, lines 1-10).

Eguchi teaches that the liquid crystal material is arranged so that it has a first stable molecular configuration in response to a first unidirectional electric field of a first direction, the suitable magnitude and duration of said electric field being applied across said electrodes (Ea, column 8, lines 40-53), and a second stable molecular configuration in response to a second unidirectional electric field of a second direction and suitable magnitude and duration being applied across said electrodes, said second configuration being different from said first configuration, the first and second directions of the first and second unidirectional fields being opposite to each other (Eb of which direction is opposite to that of Ea, whereby the directions of the liquid crystal molecules are changed, column 8, lines 40-53). The liquid crystal in the invention of Eguchi is not nematic. However, the prior art section of Eguchi teaches the use of nematic liquid crystal (column 1, lines 25-26) for the purpose of providing the liquid crystal layer of the liquid crystal display (column 1, lines 24-26). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have used nematic liquid crystal as the liquid crystal of Eguchi, in order to provide the liquid crystal display layer with the physical properties of the nematic liquid crystal, as taught by the prior art of Eguchi.

Eguchi fails to teach that the composition comprising liquid crystal material further comprises finely divided solid particles dispersed therein, let alone that they are

silica particles with a size in the range of 1 to 1000 nm, which are capable of triboelectric charging and acquiring charge in suspension in a liquid crystal material.

However, Takano teaches that a composition comprising nematic liquid crystal and finely divided solid particles (silica powder) dispersed therein is used in a liquid crystal cell (abstract). Takano teaches that the particles are silica particles with a size of 200 nm (0.2 micron, abstract), which is within the claimed range of 1 to 1000 nm, and which are capable of triboelectric charging, and of acquiring charge in suspension in a liquid crystal, as defined by Applicant's specification (page 20, section [0044]). Takano teaches that the composition is for the purpose of allowing low voltage driving of the liquid crystal cell, and of providing the display with a high contrast and improved response speed (abstract).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have used a composition comprising nematic liquid crystal and finely divided solid particles dispersed therein, as the composition of the liquid crystal layer of Eguchi, in order to allow low voltage driving of the liquid crystal cell, and to provide the liquid crystal display with a high contrast and improved response speed, as taught by Takano.

Regarding claim 4, Eguchi teaches that the liquid crystal display device further includes drive electronics for applying the unidirectional electric fields to the electrodes (multiplexing drive scheme, column 16, lines 33-35).

Regarding claim 14, Eguchi teaches the use of at least one polarizer for distinguishing between different optical states of the liquid crystal material (column 11, lines 32-45).

Regarding claim 16, Eguchi teaches in Fig. 1 on a prior page, a bistable liquid crystal display device (image, column 3, lines 43-49) comprising: two cell walls (a pair of substrates 11a and 11b, column 4, lines 52-55) enclosing a layer of a composition comprising liquid crystal material 15 (column 4, lines 63-66), at least one of said cell walls being translucent (glass plates, column 4, lines 52-53); at least one electrode on each of said cell walls for applying an electric field across at least some of said liquid crystal material (electrodes 12a and 12b, column 4, lines 52-55); a first surface alignment on an inner surface of one of said cell walls for inducing adjacent molecules of said liquid crystal material to adopt a first orientation (13a, column 4, lines 63-65), and a second surface alignment on an inner surface of the other of said cell walls (13b, column 4, lines 63-65). Eguchi teaches embodiments wherein the second surface alignment (rubbing uniaxial alignment treatment, column 7, lines 1-5) on an inner surface of the other of said cell walls (13b, column 4, lines 63-65) induces adjacent molecules of said liquid crystal molecules to adopt a second orientation which is different from said first orientation (rubbing directions which may be anti-parallel to each other or cross each other with a small intersection angle, column 7, lines 1-10). Eguchi teaches that the liquid crystal display device further includes drive electronics for applying the unidirectional electric fields to the electrodes (multiplexing drive scheme,

column 16, lines 33-35), and at least one polarizer for distinguishing between different optical states of the liquid crystal material (column 11, lines 32-45).

Eguchi teaches that the liquid crystal material is arranged so that it has a first stable molecular configuration in response to a first unidirectional electric field of a first direction, the suitable magnitude and duration of said electric field being applied across said electrodes (Ea, column 8, lines 40-53), and a second stable molecular configuration in response to a second unidirectional electric field of a second direction and suitable magnitude and duration being applied across said electrodes, said second configuration being different from said first configuration, the first and second directions of the first and second unidirectional fields being opposite to each other (Eb of which direction is opposite to that of Ea, whereby the directions of the liquid crystal molecules are changed, column 8, lines 40-53). The liquid crystal in the invention of Eguchi is not nematic. However, the prior art section of Eguchi teaches the use of nematic liquid crystal (column 1, lines 25-26) for the purpose of providing the liquid crystal layer of the liquid crystal display (column 1, lines 24-26). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have used nematic liquid crystal as the liquid crystal of Eguchi, in order to provide the liquid crystal display layer with the physical properties of the nematic liquid crystal, as taught by the prior art of Eguchi.

Eguchi fails to teach that the composition comprising liquid crystal material further comprises finely divided solid particles dispersed therein, let alone that they are silica particles with a size in the range of 1 to 500 nm.

However, Takano teaches that a composition comprising nematic liquid crystal and finely divided solid particles (silica powder) dispersed therein is used in a liquid crystal cell (abstract). Takano teaches that the particles are silica particles with a size of 200 nm (0.2 micron, abstract), which is within the claimed range of 1 to 500 nm. Takano teaches that the composition is for the purpose of allowing low voltage driving of the liquid crystal cell, and of providing the display with a high contrast and improved response speed (abstract).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have used a composition comprising nematic liquid crystal and finely divided solid particles dispersed therein, as the composition of the liquid crystal layer of Eguchi, in order to allow low voltage driving of the liquid crystal cell, and to provide the liquid crystal display with a high contrast and improved response speed, as taught by Takano.

4. Claims 6, 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eguchi in view of Takano as applied to claims 1-4, 9-10, 14, 16 above, and further in view of Crawford (US 5,956,113).

Eguchi in view of Takano has been discussed above, and fails to teach that the silica particles have a size in the range of 5 to 50 nm, the amount in which the silica particles are present in the liquid crystal composition.

However, Crawford teaches a bistable liquid crystal display, wherein the liquid crystal layer is formed from a composition comprising liquid crystal and silica particles (agglomerates, column 1, lines 5-10), which are commercial Aerosil (silica particles,

column 7, lines 1-3) used by Applicant (specification, page 11, section [0026]), and are thus expected to have a size in the range of 5 to 50 nm. Crawford teaches that the particles are present in a concentration of 0.5 to 1.0 % by weight (column 6, line 67, column 7, line 1), which overlaps the claimed range of from 0.1 to 25 % by weight, from 1 to 15 % by weight, and from 1 to 5 % of the composition. Crawford teaches that the silica particles are added for the purpose of allowing a weakly scattering state even after the voltage is removed (column 6, lines 36-50).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have used silica particles with a size in the range of 5 to 50 nm, in an amount within the ranges of from 0.1 to 25 % by weight, from 1 to 15 % by weight, and from 1 to 5 %, as the silica particles in the liquid crystal layer composition of Eguchi in view of Takano, in order to provide a weakly scattering state even after the voltage is removed from the liquid crystal display, as taught by Crawford.

5. Claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eguchi in view of Takano as applied to claims 1-4, 9-10, 14, 16 above, and further in view of Bryan-Brown (WO 97/39382).

Eguchi in view of Takano has been discussed above, and fails to teach an embodiment in which the first surface alignment induces planar alignment and the second surface alignment induces homeotropic alignment, or another embodiment in which both surface alignments induce planar alignment at substantially 90 degrees to each other.

However, Bryan-Brown teaches one embodiment of a liquid crystal display device in which the first surface alignment induces planar alignment and the second surface alignment induces homeotropic alignment (page 3, lines 13-20), and another embodiment in which the first surface alignment induces planar alignment (page 3, lines 13-20) and the second alignment surface induces a second alignment direction which can be planar, wherein the first and second surface alignments are at substantially 90 degrees to each other (figure (a)$v=v_2$, directions are approximately orthogonal, abstract). Bryan-Brown teaches that the alignment direction, which is non-parallel to the alignment direction of the opposite planar surface, induces a twist in the liquid crystal, which is accompanied by a change in optical transmission, and hence the device acts as an optical switch (page 6, lines 12-20).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have provided the first surface alignment which induces planar alignment, and the second surface alignment which induces homeotropic alignment in one state, and planar alignment in the second state, wherein the first and second surface alignments are at substantially 90 degrees to each other, for the bistable liquid crystal display device of Eguchi in view of Takano, in order to provide changes in optical transmission for the function of an optical switch, as taught by Bryan-Brown.

6. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Eguchi in view of Takano as applied to claims 1-4, 9-10, 14, 16 above, and further in view of Thurston (Mechanically Bistable Liquid Crystal Display Structures).

Eguchi in view of Takano has been discussed above, and fails to teach that that the liquid crystal has a pleochroic dye dissolved therein.

However, Thurston teaches that dissolving (mixing) a pleochroic dye into the liquid crystal provides optical contrast between the vertical and horizontal states and is thus used with at least one polarizer (column 2073a, first paragraph below Fig. 6) for the purpose of distinguishing between the different optical states of the liquid crystal.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have dissolved pleochroic dye in the liquid crystal of Eguchi in view of Takano, in order to obtain a method to distinguish between the different optical states of the liquid crystal, as taught by Thurston.

Response to Arguments

7. Applicant's arguments with respect to claims 1-16 have been considered but are moot in view of the new ground(s) of rejection.

Allowable Subject Matter

8. Claims17-27 are allowed. The closest cited prior art of record US 5,498,762 fails to teach or suggest, even in view of JP 405061021A, US 5,956,113, WO 97/39382, GB 2 324 620A, and Thurston (Mechanically Bistable Liquid Crystal Display Structures) to teach the electrophoretically-controlled bistable liquid crystal display devices comprising a first cell wall and a second cell wall enclosing a layer of nematic liquid crystal material having finely divided charged particles dispersed therein, at least one electrode on each

cell wall for applying an electric field across at least some of said liquid crystal material, whereby the application of a DC electric field pulse causes movement of charged particles away from the first cell wall, for the purpose of influencing the alignment of the liquid crystal molecules in the layer of liquid crystal, or causes their migration to the first or second surface, for the purpose of inducing the liquid crystal material to adopt a second orientation. There is no motivation to combine with Bartolino (Polarity sensitive electrooptical response in an nematic liquid-crystal-polymer mixture).

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication should be directed to Sow-Fun Hon whose telephone number is (571)272-1492. The examiner can normally be reached Monday to Friday from 10:00 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harold Pyon, can be reached at (571)272-1498. The fax phone number for the organization where this application or proceeding is assigned is (571)273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

S. Hon.

Sow-Fun Hon

01/03/05

/Harold Pyon/

HAROLD PYON
SUPERVISORY PATENT EXAMINER
1772

1/3/05